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BORKENTHELEA, A NEW PREDACEOUS MIDGE GENUS FROM SUBANTARCTIC ARGENTINA AND CHILE (DIPTERA: CERATOPOGONIDAE)

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Abstract.—***Borkenthelea nothofagus***, a new genus and species of predaceous midge of the tribe Ceratopogonini, is described and illustrated. This new genus from the temperate subantarctic *Nothofagus* forest of Argentina and Chile is compared with other genera in the Ceratopogonini.

Key Words: Diptera, Ceratopogonidae, Ceratopogonini, predaceous midges, Neotropical, subantarctic, Argentina, Chile

Among the ceratopogonids in the collection of the U.S. National Museum of Natural History (USNM) is a single male of the tribe Ceratopogonini captured by R. C. and E. Shannon during 1926 in the subantarctic *Nothofagus* forest of southwestern Argentina. Our attempts to readily place this enigmatic specimen in a currently recognized genus proved difficult. GRS spent a brief period in 1988 collecting Diptera in the same area of Argentina and captured two females that appear to be conspecific with the male collected by the Shannons. He recently returned to an adjacent area of Chile in November 1992 in an attempt to obtain additional specimens and was only successful in capturing a single female of this species. We have recently examined another female of this species from Chile in the Canadian National Collection (CNCI).

Because these specimens apparently belong to an undescribed genus, we herein propose a new genus for them. For general terminology of the Ceratopogonidae, see Downes and Wirth (1981); for special terms dealing with the tribe Ceratopogonini, see Wirth and Grogan (1988). Specimens are mounted on microscope slides in Canada balsam in the manner of Wirth and Marston (1968) or Borkent and Bissett (1990).

Borkenthelea Spinelli and Grogan, New Genus

Type-species, *Borkenthelea nothofagus* Spinelli and Grogan, new species.

Diagnosis.—The only genus in the tribe Ceratopogonini with the following combination of characters. Eyes pubescent, contiguous. Antenna with sensilla coeloconica on flagellomere 1; small, thin sensilla trichodea present on distal portions of flagellomeres 2–5, variably on 6–7, absent on 8. Palpus 5-segmented; segment 3 with small sensory pit; segment 4 with 2–4 setae. Katepisternum without enlarged setae. Legs unarmed; hind tarsomere 1 with well developed palisade setae; 4th tarsomeres subcordiform; female claws moderately large, unequal sized, hind pair massive and most unequal in size, all without basal inner or outer teeth, male claws small, simple with bifid tips. Wing membrane infuscated with

abundant macrotrichia on distal ½; radial veins very thick, two equal sized radial cells; media petiolate with long petiole; costal ratio of female 0.55–0.57, of male 0.55. Distal portion of sternite 8 and most of sternite 9 of female covered with spiculate membrane; sternite 10 of female with two pair of setae, one very large; two large and one small spermathecae. Male tergite 9 very short, triangular, with small bulbous apicolateral processes; aedeagus triangular, very short (length/width = 0.31); parameres fused basally.

Etymology.—This new genus is named in honor of our good friend and colleague, Art Borkent, in recognition of his superb contributions to our knowledge of the systematics of nematocerous Diptera.

Comparison with similar genera.—*Borkenthelea* keys to couplet 36a, *Brachypogon* (*Isohelea*), in Wirth and Grogan (1988) and we originally thought that it could be a highly modified member of that subgenus of *Brachypogon*. However, Spinelli (1990) chose not to include it in his review of the Argentinean species of *Brachypogon* for a number of reasons. Although *Borkenthelea* has a wing with two radial cells like typical members of the subgenus *Isohelea* of *Brachypogon*, species of this subgenus have macrotrichia only along the distal margin of the wing and M2 is often lacking but if present its base is usually interrupted and the petiole of the media is shorter. Furthermore, species of *B.* (*Isohelea*) usually have 2 or less setae on the 4th palpal segment, and females have claws usually with at least basal inner teeth, 1 or 2 spermathecae and sternite 10 has only a single pair of setae.

Recently, Borkent (1992) and Grogan and Borkent (1992) provided some new characters to better differentiate *Brachypogon* from its relatives and other similar genera. They pointed out that *Brachypogon* and its nearest relatives (*Ceratoculicoides, Rhynchohelea, Nannohelea, Sinhalohelea*) all share a synapomorphy of having at least one enlarged katepisternal seta, and thereby form a monophyletic group. This character is absent in *Borkenthelea*, therefore excluding it from this assemblage.

Szadziewski (1984) described *Brachypogon* (*Isohelea*) *surae* from Algeria and consulted WLG on its generic status. This species differs from typical *Brachypogon* (*Isohelea*) by having two large and one very small spermathecae, female sternite 10 with one large and one small pair of setae, and the male antenna has only flagellomeres 2–9 (?10) fused. Borkent (1992) recently noted that this species lacks large katepisternal setae and that it probably belongs to an as yet undescribed genus. Regardless, it differs from *Borkenthelea* in having a wing with macrotrichia only on the distal margin, thinner radial veins, the female claws have basal inner teeth, the 4th palpal segment has 1–2 seate, and the male tergite 9 is longer and expanded distally.

Borkenthelea resembles several other genera of the tribe Ceratopogonini by having sensilla coeloconica on flagellomere 1 and a wing with two radial cells. Most notable of these is *Macrurohelea*, a southern hemisphere genus known from southern South America and Australia. It differs from *Borkenthelea* by its wing with the 2nd radial cell of females 2–4 times longer than the 1st, costal ratio of females 0.68–0.90 and membrane without macrotrichia, and the female sternite 10 is elongated and bent forward ventrally (Wirth and Grogan 1988).

The Holarctic *Ceratopogon* differs from *Borkenthelea* in lacking a hind tibial spur (Borkent 1992). The Afrotropical *Congohelea* differs from *Borkenthelea* by having a single spermatheca, a spinose fore femur, the 2nd radial cell is much longer than the first and the costal ratio is 0.81 (Wirth and Grogan 1988). The pantropical and subtemperate *Echinohelea* differs from *Borkenthelea* in having a single spermatheca, female claws with basal inner teeth, spinose legs, long slender radial cells and a costal ratio of 0.75 or more (Wirth and Grogan 1988). *Notiohelea*, known only from 2 species from

subantarctic Chile and Argentina, differs from *Borkenthelea* by its wing membrane lacking microtrichia, 2nd radial cell 2–3 times longer than 1st, costal ratio 0.77 or more, tarsomeres 1 and 2 of fore leg with palisade setae, and female claws small equal sized (Grogan and Wirth 1979, Spinelli and Grogan 1990). *Washingtonhelea,* known only from a single species from southern California, differs from *Borkenthelea* by its single spermatheca, wing membrane without macrotrichia, M2 complete to base, lacking a hind tibial comb and female claws small with basal inner barbs (Wirth and Grogan 1988).

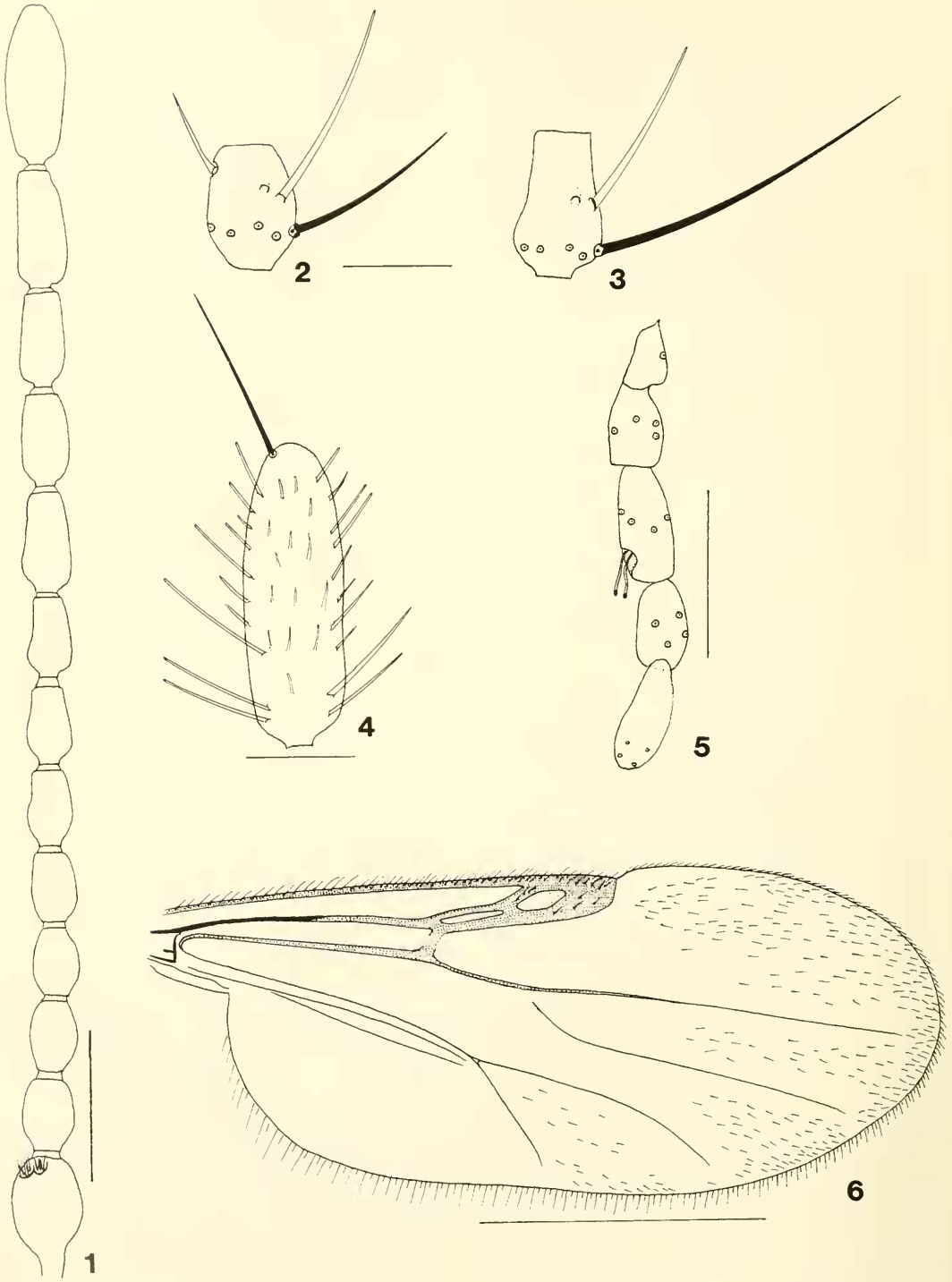
All other genera of the tribe Ceratopogonini differ from *Borkenthelea* by either lacking sensilla coeloconica on flagellomere 1 or in having a single radial cell or none (Wirth and Grogan 1988).

Borkenthelea nothofagus Spinelli and Grogan, New Species

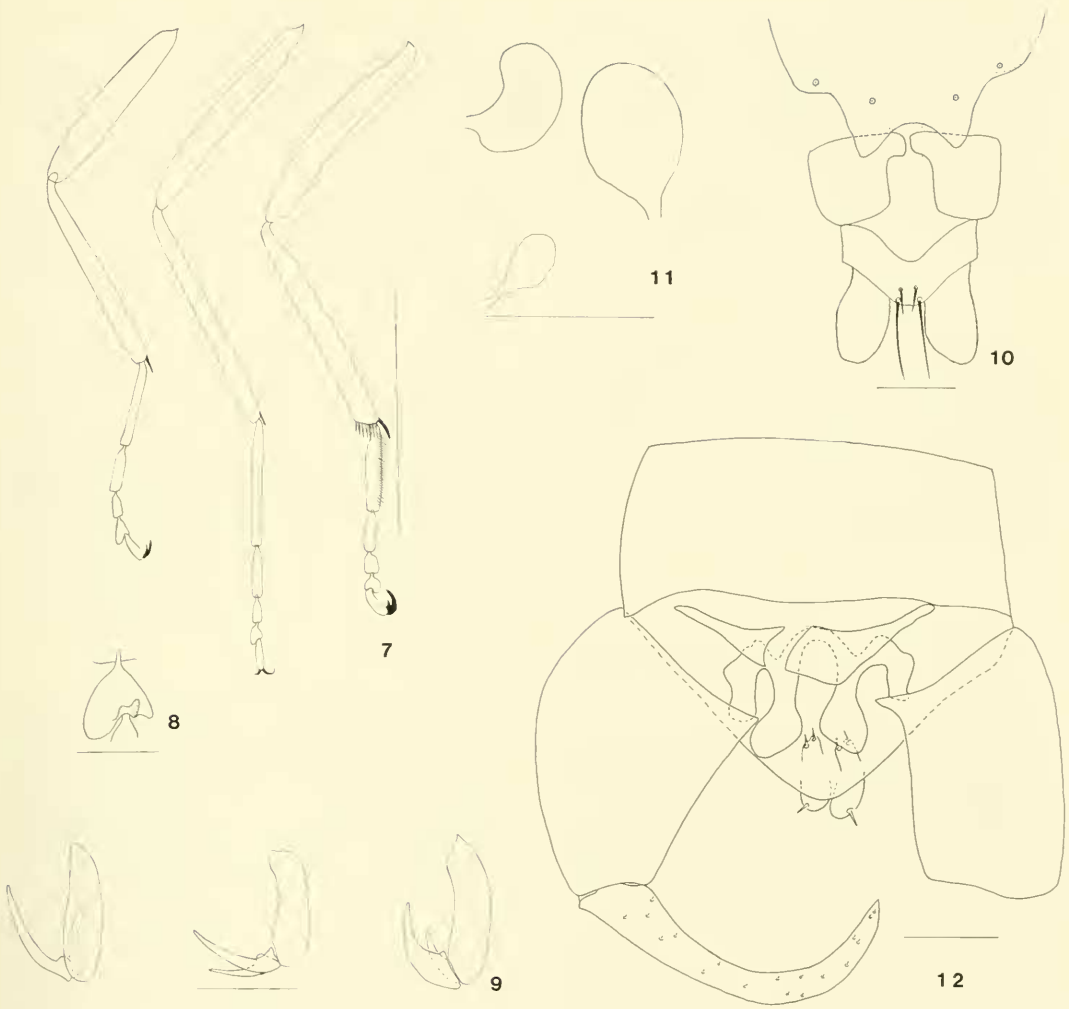
Figs. 1–12

Female.—Wing length 1.00–1.35 mm; breadth 0.46–0.58 mm. *Head:* Dark brown. Eyes pubescent, contiguous for a distance equal to the diameter of 2.5 ommatidia. Antennal flagellum (Fig. 1) brown; flagellomere 1 with 2 subapical sensilla coeloconica, 4–5 sensilla chaetica, and 2 large sensilla trichodea; flagellomeres 2–7 (Fig. 2) with 4–5 sensilla chaetica, 2 large and one small sensilla trichodea; flagellomere 8 (Fig. 3) as in 2–7 but lacking the small sensilla trichodea which are sometimes absent on 2–7; flagellomere 13 (Fig. 4) with one apical sensilla chaetica; lengths of flagellomeres in proportion of 20-12-12-12-12-13-13-13-16-16-16-20-27; antennal ratio 0.88–0.90. Clypeus with 1–3 pairs of setae. Palpus (Fig. 5) brown; segment 3 with small shallow sensory pit; lengths of segments in proportion of 8-11-14-9-14; palpal ratio 2.20–2.30. Mandible with 9–10 teeth. *Thorax:* Dark brown; 4–5 prealar setae, 1 postalar; scutellum with 2 medial and 2 lateral setae. Wing (Fig. 6) membrane infuscated, covered with microtrichia and distal ½ with macrotrichia; wing moderately broad, 2.33 times longer than broad, anal lobe well developed; anterior veins dark brown, posterior veins lighter; 2 well formed radial cells, 1st with elongated narrow lumen, 2nd shorter with broader lumen; radial veins thickened especially distal of the 2nd radial cell; r-m crossvein short, ¼ length of petiole of media; veins M1, M2, CuA1 obsolete at apices, M2 obsolete at extreme base, media with long petiole, branching at level of R2+3, cubitus branching at level of mid-length of 1st radial cell; costal ratio 0.55–0.57. Halter pale. Legs (Fig. 7) brown; femora and tibiae slender, unarmed, hind tibial comb with 8 setae; hind tarsomere 1 with well developed palisade setae; hind tarsal ratio 2.00; tarsomeres 4 (Fig. 8) subcordiform; tarsomeres 5 (Fig. 9) slender with moderately large, unequal sized claws without basal teeth, those of hind leg most massive, claw proportions of fore, mid and hind legs, 21:9, 16:9, 16:9. *Abdomen:* Dark brown; segments 8–10 very heavily sclerotized. Genitalia as in Fig. 10; distal portion of sternite 8 and most of sternite 9 covered with spiculate membrane; sternite 10 with large, smaller pair of setae. Three ovoid spermathecae (Fig. 11) with distinct slender necks; largest 0.048 × 0.036 mm, mid sized partially collapsed in Argentina specimens, 3rd very small.

Male.—Wing length 1.05 mm; breadth 0.46 mm. Similar to female with the following notable sexual differences: Antennal flagellum missing from preparation; mandible vestigial, without teeth; claws small, equal sized, simple with bifid tips; costal ratio 0.55. Genitalia as in Fig. 12. Sternite 9 twice as broad as long, caudal margin nearly straight; tergite 9 very short, nearly triangular, with 4 subapical setae, apicolateral process small bulbous with a single subapical seta, cercus ventrally located with two apical setae. Gonocoxite stout, 1.5 times longer than broad with a slender mediobasal lobe; gonostylus slender covered with small



Figs. 1–6. *Borkenthelea nothofagus*, female. 1, flagellum; 2, flagellomere 2; 3, flagellomere 5; 4, flagellomere 13; 5, palpus; 6, wing. Scale bars = 0.05 mm (Figs. 1–5); 0.5 mm (Fig. 6).



Figs. 7–12. *Borkenthelea nothofagus*. 7–11 female; 12, male. 7, legs from left to right fore, mid, hind; 8, tarsomere 4; 9, 5th tarsomeres and claws, from left to right fore, mid, hind; 10, 12, genitalia; 11, spermathecae. Scale bars = 0.5 mm (Fig. 7); 0.05 mm (Figs. 8–12).

setae arranged as indicated, slightly longer than gonocoxite, distal ½ curved nearly 90°, tip pointed. Aedeagus very short (length/width = 0.31), heavily sclerotized, triangular. Parameres fused basally; basal apodeme recurved, broad distally; distal portions together forming a U-shaped structure, each portion with swollen, divergent tip.

Distribution and bionomics.—Known only from the temperate subantarctic *Nothofagus* forest of southwestern Argentina and Chile. The two females from the type-locality were swept from above a shallow muddy depression at the base of Volcan Tronador.

Types.—Holotype female, paratype female, Argentina, Rio Negro Prov., parque nac. "Nahuel Huapi," Cerro Tronador, 25-I-1988, G. Spinelli, deposited in the Museum de La Plata, Argentina (MLPA); allotype male, Argentina, Rio Negro Prov., Correntoso, XI-1926, R. & E. Shannon

(USNM); paratype female, Chile, Valdivia, Lago Neltume, 26-XI-1992, G. R. Spinelli, sweep net (MLPA); paratype female, Chile, Cautin, 1150 m, Conguillo Nat. Park, 4–5.II. 1988, L. Masner (CNCI).

Etymology.—The specific epithet, a noun in apposition, refers to the *Nothofagus* forest where this species was collected.

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Literature Cited

Borkent, A. 1992. A new key to some genera of Ceratopogonini in the Holarctic (Diptera: Ceratopogonidae). Entomologica Scandinavica 22(1991): 433–436.

Borkent, A. and B. Bissett. 1990. A revision of the Holarctic species of *Serromyia* Meigen (Diptera: Ceratopogonidae). Systematic Entomology 15: 153–217.

Downes, J. A. and W. W. Wirth. 1981. Ceratopogonidae, Chapter 28, pp. 393–421. *In* McAlpine, J. F. et al., eds., Manual of Nearctic Diptera. Vol. I. Agriculture Canada Monograph 27, Ottawa. 647 pp.

Grogan, W. L., Jr. and A. Borkent. 1992. *Sinhalohelea,* a new genus of predaceous midge from Sri Lanka (Diptera: Ceratopogonidae). Proceedings of the Entomological Society of Washington 94: 314–319.

Grogan, W. L., Jr. and W. W. Wirth. 1979. *Notiohelea,* a new genus of biting midges of the tribe Ceratopogonini from Chile (Diptera: Ceratopogonidae). The Pan-Pacific Entomologist 54(1978): 283–286.

Spinelli, G. R. 1990. The genus *Brachypogon* in Argentina, with a key to the Neotropical species (Diptera: Ceratopogonidae). Revista brasileira Entomologia 34: 743–755.

Spinelli, G. R. and W. L. Grogan, Jr. 1990. New species of predaceous midges of the tribe Ceratopogonini from subantarctic Argentina (Diptera: Ceratopogonidae). Proceedings of the Entomological Society of Washington 92: 127–134.

Szadziewski, R. 1984. Ceratopogonidae (Diptera) from Algeria. V. *Brachypogon* (*Isohelea*) *surae* n. sp. (Ceratopogonini). Polskie Pismo Entomologiczne 53: 555–558.

Wirth, W. W. and W. L. Grogan, Jr. 1988. The predaceous midges of the world (Diptera: Ceratopogonidae; Tribe Ceratopogonini). Flora and Fauna Handbook no. 4. E. J. Brill, New York. xv + 160 pp.

Wirth, W. W. and N. Marston. 1968. A method for mounting small insects on microscope slides in Canada balsam. Annals of the Entomological Society of America 61: 783–784.